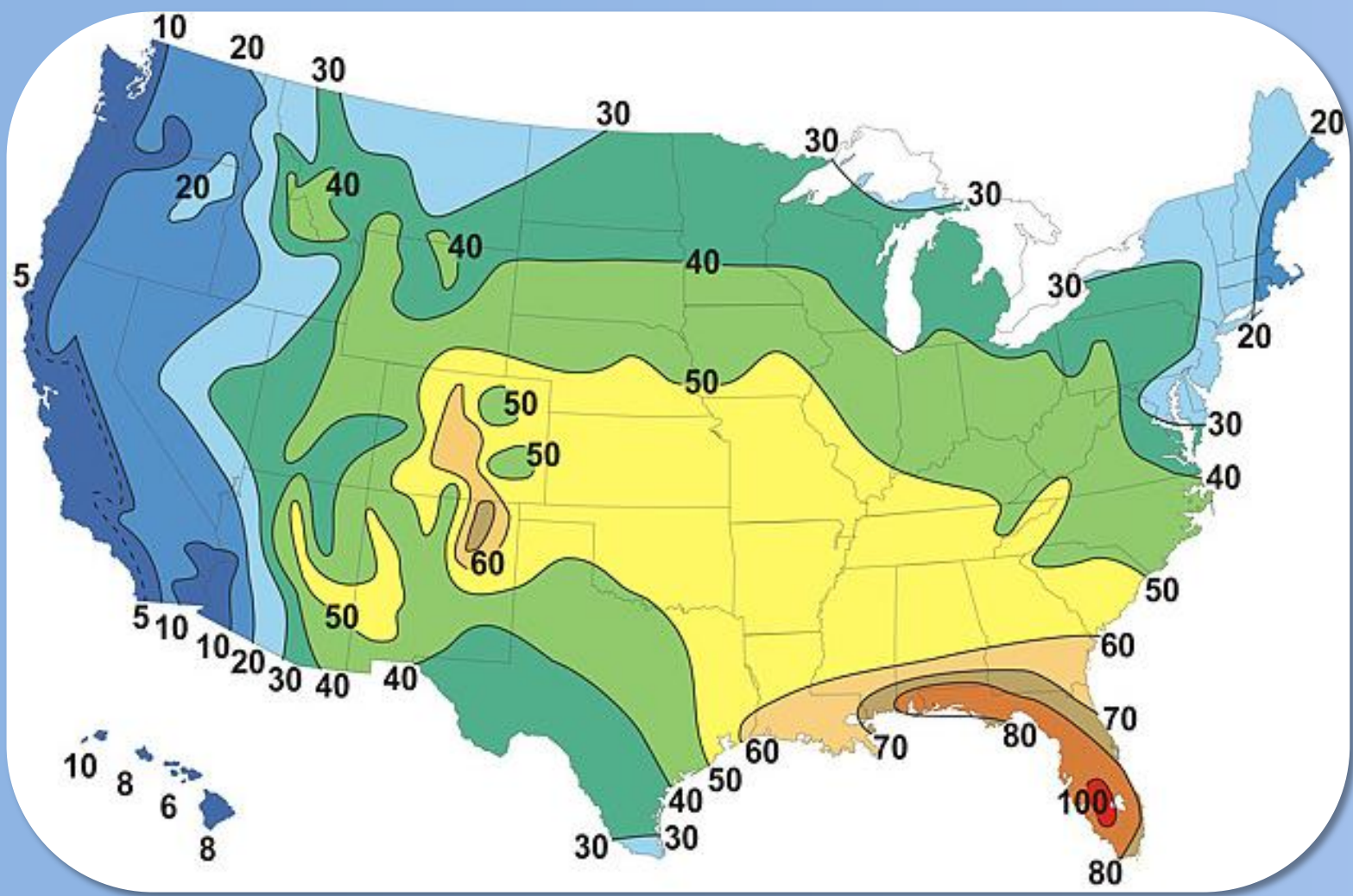


SEVERE THUNDERSTORMS



AVERAGE NUMBER OF THUNDERSTORM DAYS PER YEAR



ALL Thunderstorms are Dangerous!

An estimated 100,000 thunderstorms occur each year in the United States

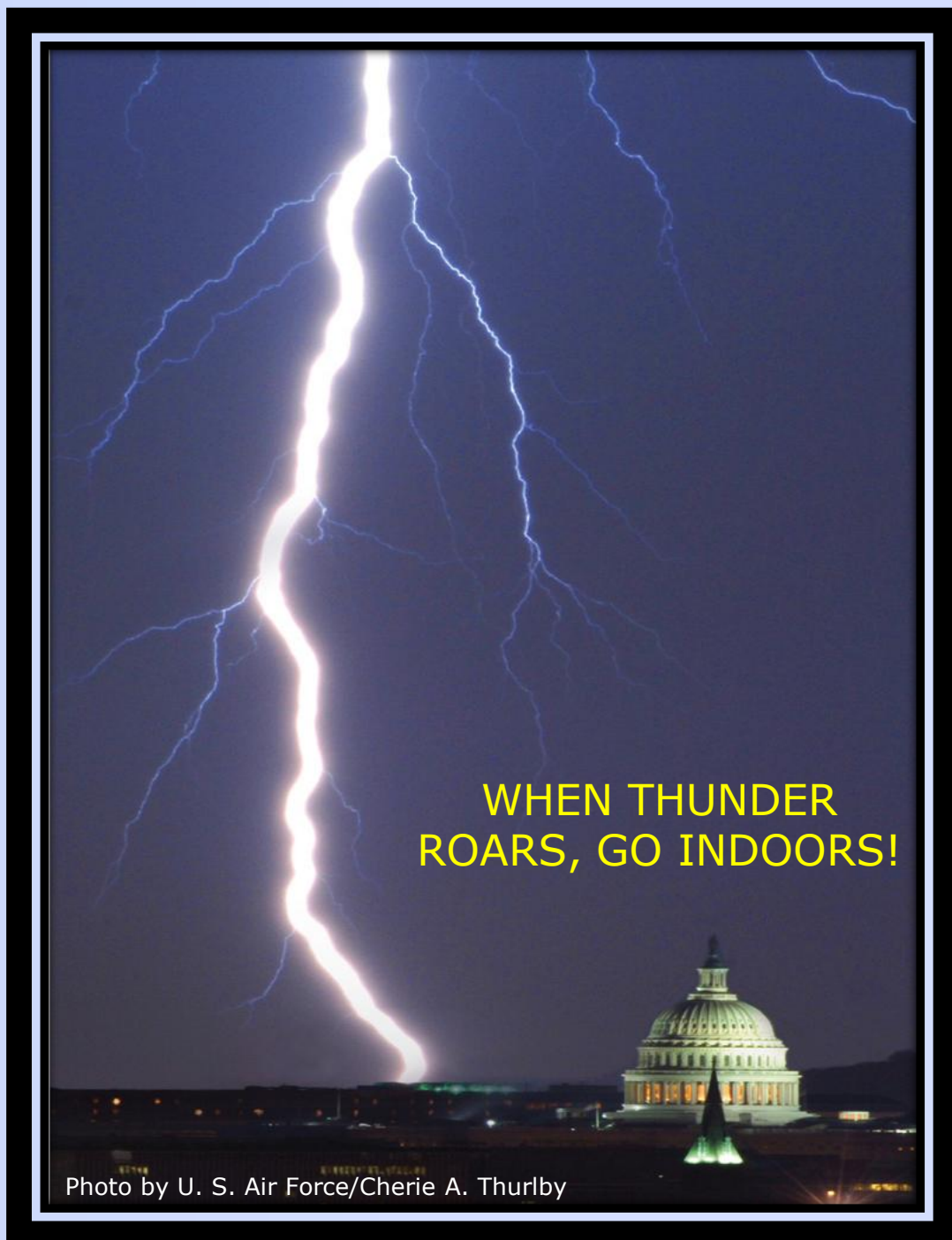
About 10 percent of all thunderstorms are classified as **SEVERE**

A Severe Thunderstorm Warning is issued when winds reach 58 mph, or hail is at least 1 inch

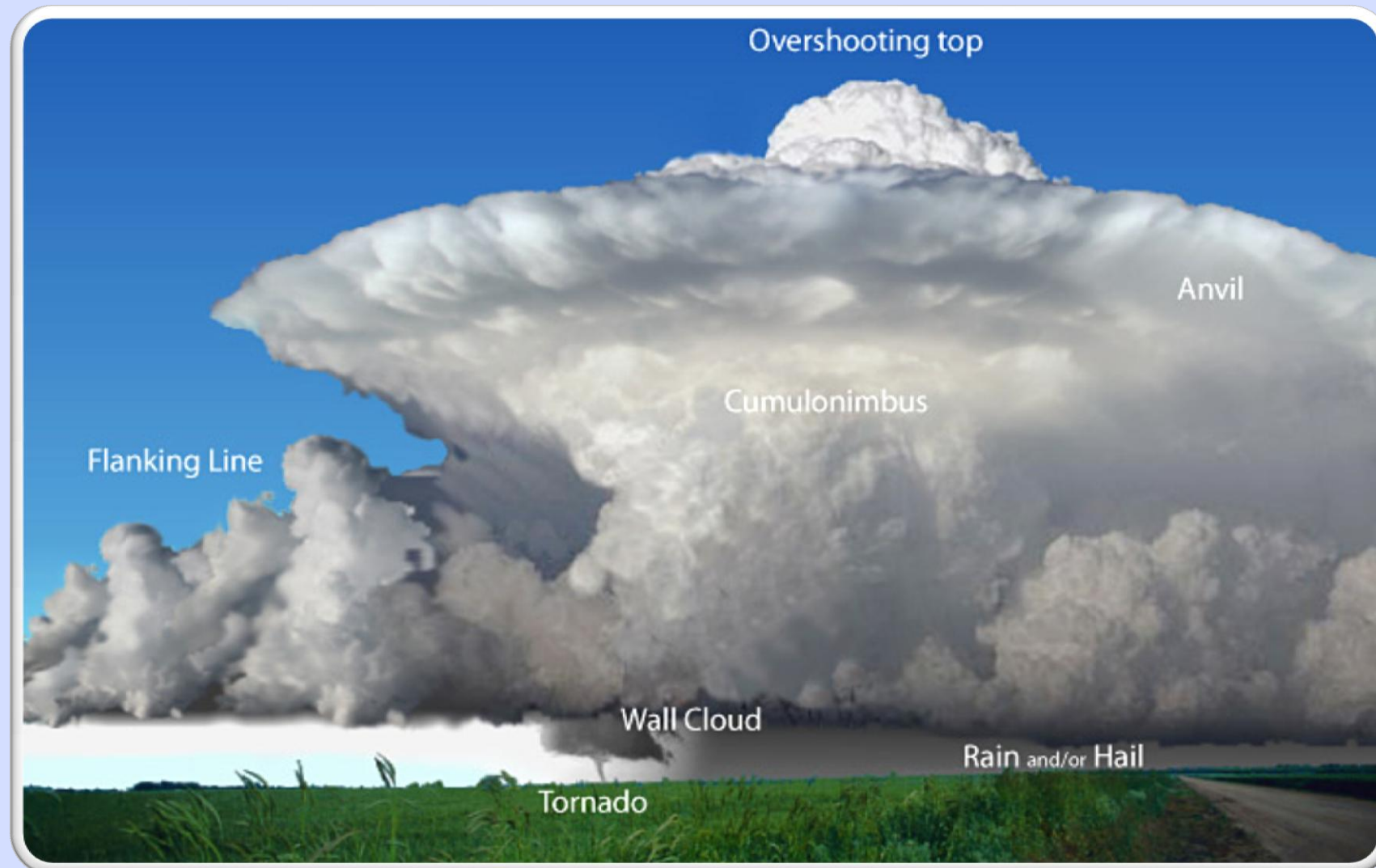
Florida is the Thunderstorm Capital of the United States.

THE FOUR BASIC TYPES OF THUNDERSTORMS

Single Cell	Multicell Cluster	Multicell Line	Supercell
Weak updraft (non-severe) Or Strong updraft (severe)	Weak updraft (non-severe) Or Strong updraft (severe)	Weak updraft (non-severe) Or Strong updraft (severe)	Intense updraft (nearly always severe) MESOCYCLONE (Rotating Thunderstorm)
Slight Threat	Moderate Threat	Moderate Threat	HIGH THREAT



SCHEMATIC OF A SUPERCCELL THUNDERSTORM



Thunderstorms grow up to 10 miles high in the atmosphere!

SUPERCCELL THUNDERSTORM IN FLAGLER COUNTY, FL

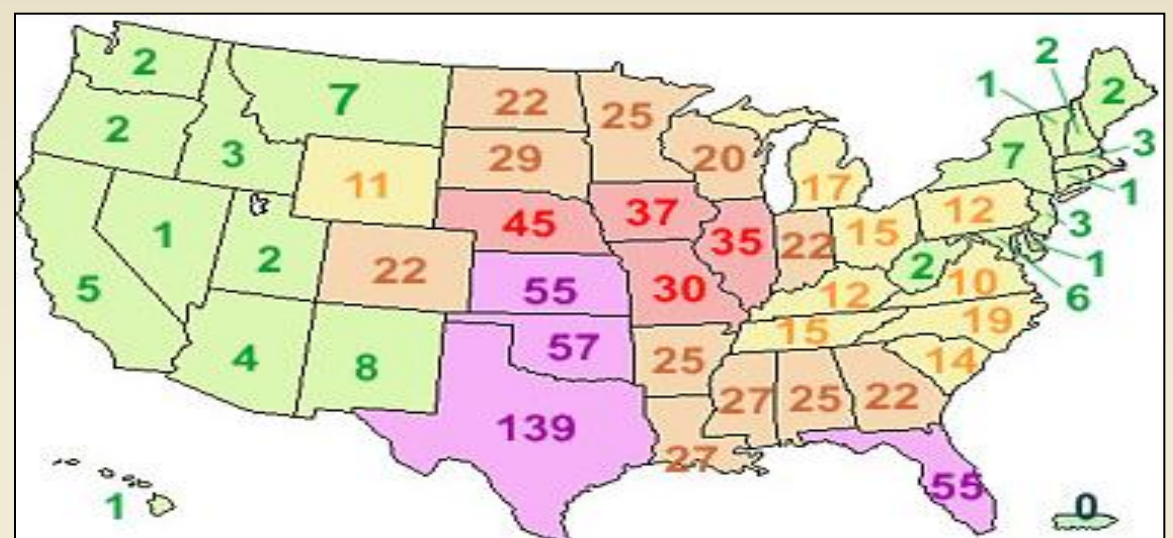


Photo by Tracey Downing July, 2009

TORNADO

The Enhanced Fujita Scale		
Rating	Description	Wind Speed
EF0	Gale tornado	65-85 mph
EF1	Moderate tornado	86-110 mph
EF2	Significant tornado	111-135 mph
EF3	Severe tornado	136-165 mph
EF4	Devastating tornado	166-200 mph
EF5	Incredible tornado	> 200 mph

AVERAGE NUMBER OF TORNADOES PER YEAR (1953-2004)



Weak Tornadoes

- 88% of all tornadoes
- Less than 5% of tornado deaths
- Lifetime 1 – 10+ minutes
- Winds less than 110 mph
- Produces EF0 or EF1 damage

Strong Tornadoes

- 11% of all tornadoes
- Nearly 30% of all tornado deaths
- May last 20 minutes or longer
- Winds 111-165 mph
- Produces EF2 or EF3 damage

Violent Tornadoes

- Less than 1% of all tornadoes
- 70% of all tornado deaths
- Can exceed 1 hour
- Winds greater than 166 mph
- Produces EF4 or EF5 damage

St Johns River Waterspout June 26, 2009

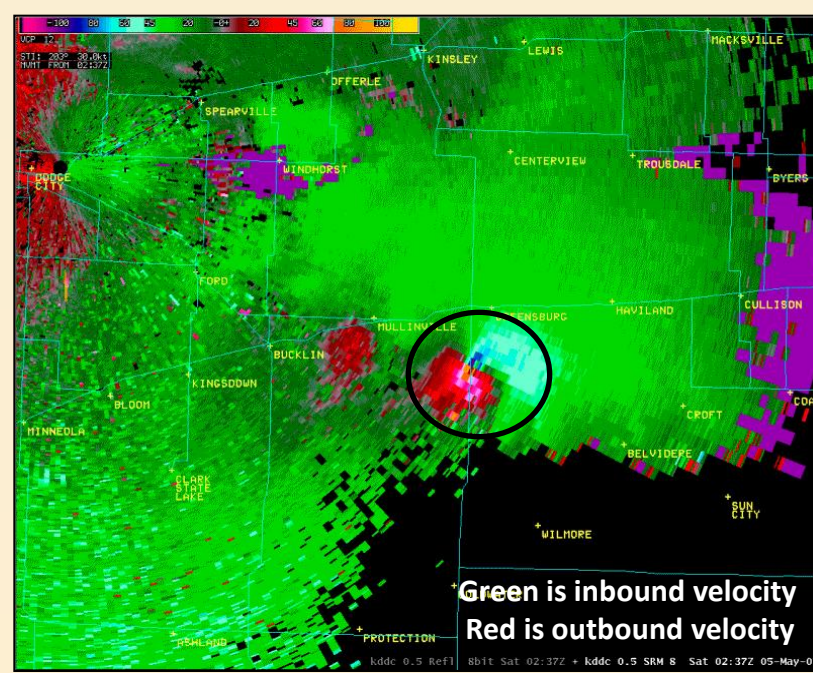


Photo courtesy of Eunice Zisser.

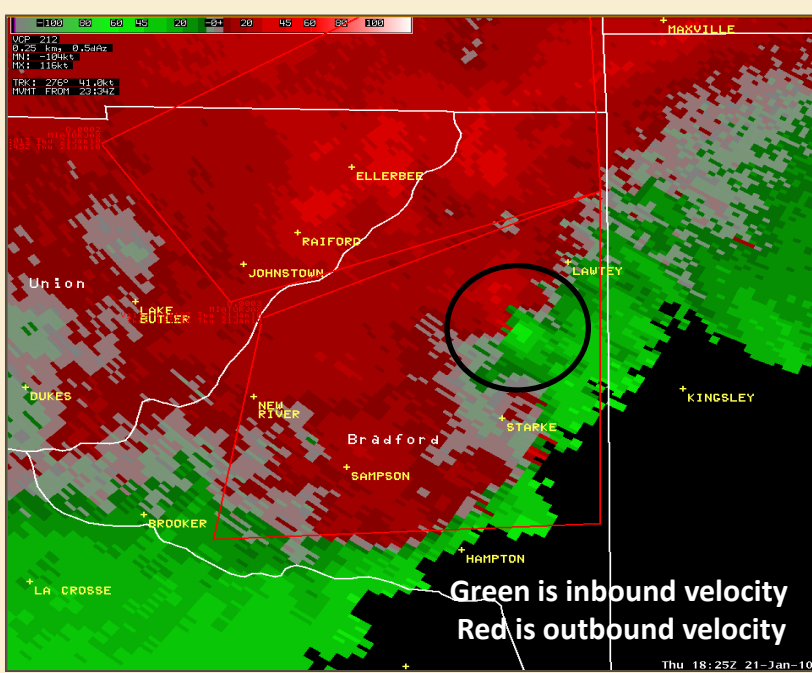
This waterspout made landfall as an EF0 Tornado in the Riverside area of Downtown Jacksonville



Photo by Sonny Connor

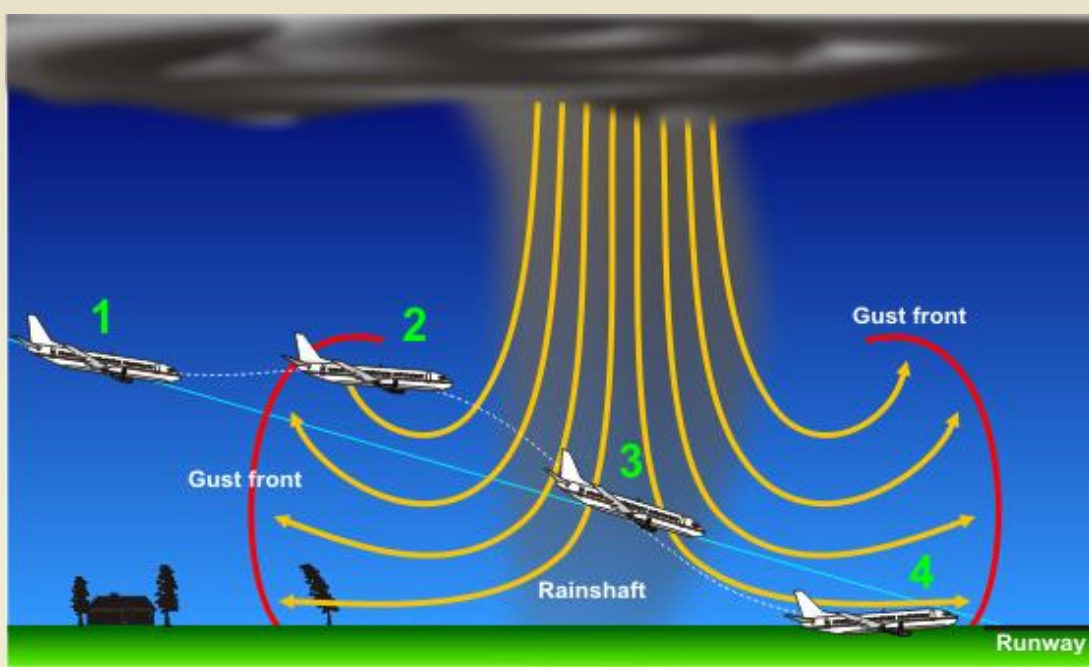


Doppler Radar Velocity Product of EF5 Tornado that devastated Greensburg Kansas May 4, 2007



Doppler Radar Velocity Product of EF1 Tornado near Starke, FL in Bradford County JAN 21, 2010

WIND



Straight-line winds are extremely dangerous to aviation

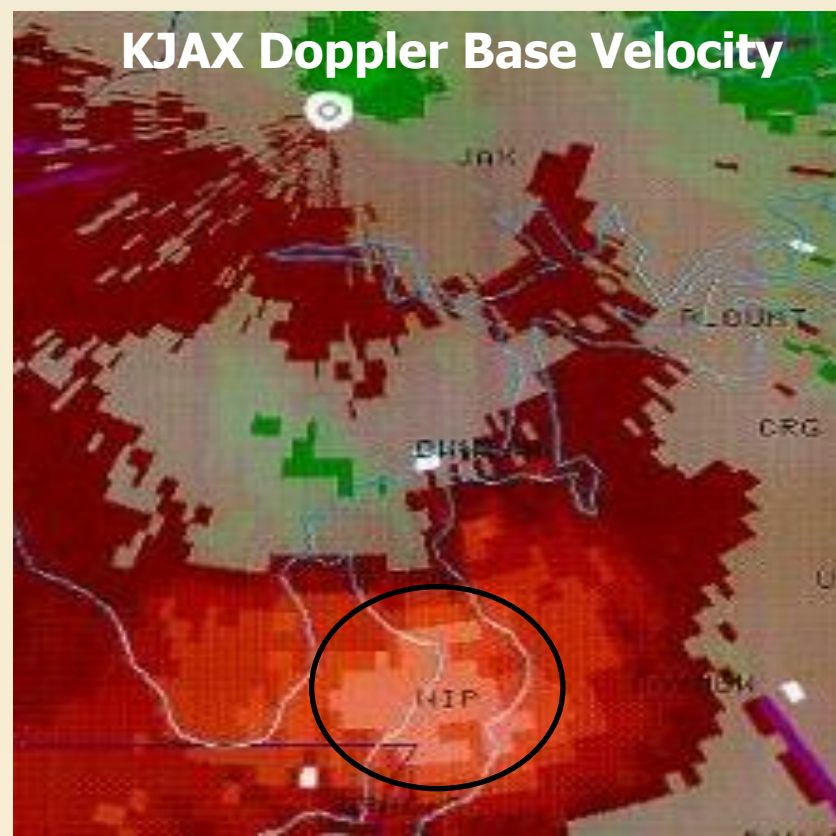
- Straight-line winds are any winds not associated with the rotation of a tornado. Straight-line winds are responsible for most thunderstorm wind damage.
- Straight-line winds can exceed 125 mph! Damage can be equivalent to a strong tornado.

- A downburst is a small area of rapidly descending air beneath a thunderstorm.
- Damaging wind from thunderstorms is much more common than damage from tornadoes.



Straight-line wind damage in Northeast Florida

Estimating Wind Speeds with Visual Cues		
Beaufort Number	Description	Visual Cues and Damage Effects
0	Calm	Calm wind. Smoke rises vertically with little if any drift.
1	Light Air	Direction of wind shown by smoke drift, not by wind vanes. Little if any movement with flags. Wind barely moves tree leaves.
2	Light Breeze	Wind felt on face. Leaves rustle and small twigs move. Ordinary wind vanes move.
3	Gentle Breeze	Leaves and small twigs in constant motion. Wind blown up dry leaves from the ground. Flags are extended out.
4	Moderate Breeze	Wind moves small branches. Wind raises dust and loose paper from the ground and drives them along.
5	Fresh Breeze	Large branches and small trees in leaf begin to sway. Crispetle swayed from on road sides and large rivers.
6	Strong Breeze	Large branches in constant motion. Whistling sounds heard in overhead or nearby power and telephone lines. Umbrellas used with difficulty.
7	Near Gale	Whole trees in motion. Inconvenience felt when walking against the wind.
8	Gale	Wind breaks twigs and small branches. Wind generally impedes walking.
9	Strong Gale	Structural damage occurs, such as chimney covers, roofing tiles blown off, and television antennas damaged. Ground is littered with many small twigs and broken branches.
10	Whole Gale	Considerable structural damage occurs, especially on roofs. Small trees may be blown over and uprooted.
11	Storm Force	Widespread damage occurs. Larger trees blown over and uprooted.
12	Hurricane Force	Severe and extensive damage. Roofs can be peeled off. Windows broken. Trees uprooted. Rvs are small mobile homes overturned. Moving automobiles can be pushed off the roadways.



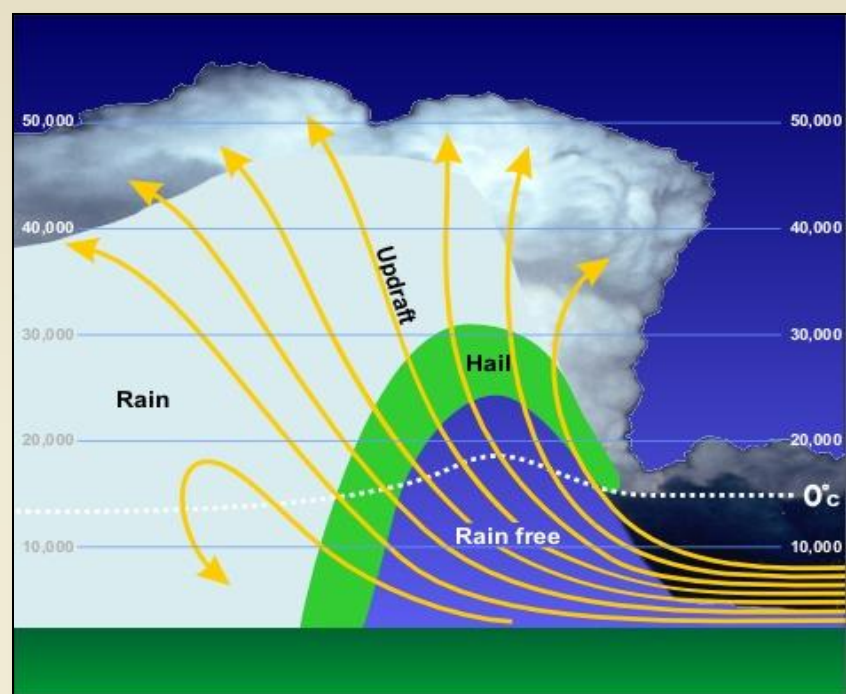
Thunderstorm winds in Jacksonville May, 1997 NAS JAX measured a wind gust of 107 MPH!!!

THUNDERSTORM DOWNBURST CAUGHT ON CAMERA



Photos by NOAA/Bill Bunting

HAIL



- Strong rising currents of air within a storm, called updrafts, carry water droplets to a height where they freeze.

- Ice particles grow in size, becoming too heavy to be supported by the updraft, and fall to the

- ground.
- Hail is larger than sleet, and forms only in thunderstorms.

- Large hailstones can fall at speeds faster than 100 mph!

Dime/Penny	0.75 inches
Nickel	0.88 inches
Quarter	1.00 inches
Half Dollar	1.25 inches
Ping Pong Ball	1.50 inches
Golf Ball	1.75 inches
Hen Egg	2.00 inches
Tennis Ball	2.50 inches
Baseball	2.75 inches
Tea Cup	3.00 inches
Grapefruit	4.00 inches
Softball	4.50 inches



Hail causes more than \$1 Billion in crop and property damage each year

WHAT'S THE LARGEST HAIL EVER RECORDED?

8 INCHES IN DIAMETER
1.94 POUNDS!!
18.63 INCHES IN CIRCUMFERENCE



Vivian, South Dakota JULY 23, 2010

Illustrations of Different Hail Sizes

